THE

Saturday Magazine.

Nº 426. FEBRUARY 23RD, 1839. { PRICE ONE PENNY.

ON STAINED GLASS WINDOWS. II.

STAINED GLASS WINDOW IN YORK CATHEDRAL.

We come now to notice those curious and instructive processes of the glass-stainer whereby the chief material is produced in

> Storied windows, richly dight,
> Casting a dim religious light.

When certain metallic substances are made, through the agency of heat, to combine with colourless glass, the result is a stain which penetrates more or less deeply into the very substance of the glass itself. As the choice and management of these metallic colouring matters are points of the greatest importance, we will first offer a few details on the subject. We have already described the general processes of glass-blowing *, so that by referring the reader to that article, he will the better appreciate the following details.

The colouring materials are in all cases metallic. Gold is employed for purple; a mixture of gold and silver gives a rose colour; iron, a brick red; iron, copper, and manganese, in various proportions, form browns and blacks. Perfectly black glass, in large slabs, is now imported from Russia, and is used instead of black marble in ornamental furniture.

Blue is obtained from cobalt, commonly called *zoffres*. The origin of this term is curious: the old glass-stainers preserved their processes with jealous secresy; and when urged to disclose them frequently gave false recipes †, one of which for a blue stain was *sapphires*. When oxide of cobalt became known as the real material, this was supposed to be the

* See *Saturday Magazine*, Vol. III., p. 131.

† The same practice is still adopted, and the "valuable recipes" for enamel colours and stains contained in many of our works on the subject, are almost worthless. M. Brongniart well observes, "It is very remarkable that if the processes described in these works were strictly followed, it would never be possible to form the colours for which those recipes are given."

sapphires of the old stainers; and by an easy corruption, it was called zaffres, under which name it is now commonly known in commerce.

Pure silver possesses the extraordinary property of staining glass *yellow* when brought in contact with it at a dull red heat, and this is the material employed for yellow, orange, or red stains; any one being produced by modifications of the same process. No flux is used; but the silver is ground with ochre or clay, and laid in a thick stratum on the glass. After the process of firing, although the silver is not found to adhere at all to the glass, yet a transparent yellow stain is imparted to it. If a large proportion of ochre be used, the stain is yellow: if the proportion be small, it is orange; and by repeated firings the latter is, in some unaccountable way, converted into ruby red; and this is the process we before alluded to for procuring this colour, although it is not equal to that of the old artists.

In enamel painting, copper yields a fine green, but it does not answer well on glass; and no other material being known to afford a good green, an ingenious contrivance is adopted. Since a mixture of yellow and blue produces green, the glass, which in other cases is stained on one side only, is in this case stained blue on one side, and then, by a second process, yellow or lemon colour on the other.

In addition to the above modes of staining glass, another mode is resorted to, when practicable. It consists in melting common glass, or its ingredients, mixed with the colouring matter, in a melting pot, in the same way that ordinary glass is made. Here the resulting panes are coloured throughout their substance, and such glass is called *pot metal*.

Another mode consists in *flashing*; that is, uniting a thin layer of coloured glass with another layer which is colourless. The coloured layer is sometimes included *between two layers* of colourless glass. Such glass is prepared thus: the glass-blower has two melting-pots in the furnace, one containing colourless and the other coloured glass, each in a melted state. He dips his rod first into the colourless glass, and then into the coloured, a portion of which adheres to the lump first taken up. If it is desired to enclose the coloured film between two colourless layers, he again dips his rod into the colourless glass. He then proceeds with the processes of *blowing* and *whirling*, as in the manufacture of the ordinary crown glass for windows. We have seen some specimens of fine ruby-glass made in France by this method, which is also employed in the formation of perfume-bottles, and other ornamental vessels of particular colours.

The production of the ruby red stain has long been a most interesting feature connected with the details of our subject. We will therefore conclude this short article with a few anecdotal remarks thereon.

Gold, copper, and silver, are the reputed sources of the splendid reds of the old stainers; and so general at one time was the notion, in France, that gold was the colouring material, that in 1793, the French government actually collected a large quantity of fine old red glass, and demolished it for the purpose of getting the gold which, as it was supposed, afforded the colouring material. It is needless to remark that they were not very successful, although it was stated, by Kunckel, that gold melted with *flint* glass afforded a fine ruby colour; but as Kunckel was a stainer by profession, and derived much profit from his ruby glass, which was really fine, there is no wonder that he did not publish his process.

When gold is employed, great care and experimental knowledge is necessary, especially as to temperature; since a slight excess of heat produces a dull blue, or a dingy brown, instead of a red. A similar remark applies when copper is the material. When taken out of the melting-pot, it often exhibits only a faint greenish tinge: it is then worked into panes, by the exposure of which to a gentle heat a brilliant red is produced: this is an extraordinary and unaccountable fact.

That copper will produce a red stain was discovered (perhaps we may say *re-discovered*) in a remarkable manner. The reader is probably aware that Plate-Glass is formed by rolling out the refined glass, in a molten state, upon a steel table. The transfer of the glass is sometimes made by tilting the melting-pot over the table, and at other times by lading it out by means of a copper ladle, which must occasionally be dipped into cold water, to prevent it from being warped, or perhaps melted, by the heat. Many years ago, at the plate-glass works of St. Gobain, the latter mode of manufacture was adopted; and on one occasion, the cold-water precaution being neglected, the ladle remained in the melting pot. The workman foolishly thought that he should find his ladle at the bottom of the melting pot: the casting was proceeded with, and all the contents of the pot exhausted, but the ladle had disappeared. No further notice was taken of the circumstance, till the glass having been annealed and being about to be polished, the workmen, to their surprise, discovered traces of the lost ladle in metallic particles of copper embedded in the glass, together with large streaks of a fine red colour. This circumstance becoming known, a variety of experiments were tried by different chemists and glass-stainers, with various degrees of success.

Such then is a brief account of the colours employed in the production of stained glass. We come now to notice the method of applying them when certain patterns or figures are required, as in the case of a church window; but for the sake of greater simplicity we will show the mode of producing a small ornament, such as a *rosette*, on a pane of colourless glass.

A pattern or drawing of the desired figure is prepared, the outlines of which are dark and well defined. This is attached to the glass by means of wafers at the corners; the glass serving the same object as the glass of a picture-frame, the design being perfectly visible through it.

The colouring materials are ground up with flint glass, lead, and borax, the ingredients of a very fusible glass, which acts as a flux. Fluidity is given to the colouring matter and flux, by mixing them with a volatile oil, such as turpentine: amber oil, capivi balsam, or gum water, are also employed.

The pane of glass, with its pattern attached, is mounted upon an easel, and the figure is painted on the glass with the above colours, by means of long haired sable pencils. A rest stick is also employed, and the general process resembles that employed in painting on canvass.

When the same figure is to be produced upon a number of similar panes of glass, the pattern need not be shifted from the first pane; but the second piece of glass being laid upon the first, the process is repeated as before.

For the production of more elaborate figures, such as the full-length portrait of a man, including a portion of the building in which he is placed, two methods are united to attain the desired result. The face and other parts are painted on a piece of glass of the desired form; but the drapery &c. are cut out from pieces of glass, to which various but equable stains have been previously imparted. These irregu-

lar pieces are built up into a picture, the joints being made with glaziers' lead, care being taken to throw such joints into the shaded parts of the picture.

The sheets of coloured glass are prepared by a process similar to the blowing and whirling as adopted by the ordinary glass-blower, in the production of common window-glass: but for certain stains, and for all designs which have been painted on panes of glass, a method of fixing the colours, by burning, is adopted. The process of burning need not be described very minutely. A slight notice thereof will be sufficient for the general reader. The panes of glass are taken separately, and placed in a box of iron-plate, called a *muffle*. This muffle is furnished with shelves of iron-plate, covered with powdered lime, to prevent the glass coming in contact with the hot metal surface. The muffle is now placed within a furnace, and the contents are gradually brought to a dull red heat, by means of fuel that does not produce *flame*; for which purpose coke and charcoal are usually employed. The heat produced must be exactly sufficient to fuse the flux, by which means the colouring material becomes firmly united to one surface (the upper one) of the panes of glass. Hollow tubes pass out from the furnace into the air, through which the process of burning in the colours can be witnessed; and it requires the watchful eye of experience to detect the precise moment when the process is complete. The fire is then damped and allowed to go out gradually; and in ten or twelve hours (the glass slowly cooling and annealing all the while), the burning process is completed.

When the glass is removed from the muffle, the colours are scraped or brushed off separately; some of the more valuable stains being reserved for repeated use, since a small fraction only of the colouring matter is absorbed by the glass.

The panes are thoroughly cleaned and separately examined. If any flaws or faults appear, the colour is again applied, and a second burning is adopted. This second burning also tends to remove spots or stains, and serves to heighten the colours.

Such then is a brief account of the processes still adopted, and which were probably adopted by the older artists in the production of stained glass. Many of the fine windows which were painted previous to the Reformation, were demolished during that eventful period. In some cases the windows were pulled down, and the glass concealed in the vaults of the holy building; and thus was it preserved from demolition. In more peaceful times the windows were restored; but it has frequently happened that the concealed glass has been forgotten; sometimes it was stolen or broken by those who were ignorant of its value. As an example of the treatment bestowed on ecclesiastic ornaments, during the time of Cromwell, we may instance the fine window over the altar-piece, in the chapel of St. Peter's College, Cambridge.

This beautiful chapel was built by subscription in 1632. Some of the embellishments with which it was decorated on its first erection were demolished or removed during the civil wars. "In 1643," say the Parliamentary Commissioners, "we went to Peterhouse, and pulled down two mighty angels, and divers other angels, the four evangelists, and Peter with his keys, on the chapel door; together with about one hundred cherubim, and many superstitious letters in gold." The beautiful painted glass, which now adorns the east window, was happily rescued from the profane hands which at that time waged war against the arts by being taken to pieces and concealed in boxes. It represents the history of our Saviour's crucifixion between the two thieves. It is said to have been copied from two different designs; one of which was painted by Rubens, for the high altar of the Recollet Church, at Antwerp; and the other, from which the groups at the sides were taken, was the composition of Lambert Lombard. A fine altar-piece, of Norway oak, is placed under the sombre but pleasing light of this rich window.

The frontispiece which illustrates the present article, is a copy of an old window in York Cathedral, the work probably of John Thornton, the terms of whose engagement we stated in our former article, p. 18.

(*From a Correspondent.*)

[In our first article on Stained Glass Windows, (page 18 of the present volume,) we gave a list of English glass-stainers, with a slight notice of their principal works. It appears that in this list we omitted the names of several stainers who are still exercising their profession; names which, as our correspondent remarks, are, "unfortunately for the artists, scarcely known." We are anxious to do justice to all; and while we cannot but regret the omissions complained of, it will be seen how difficult it is to avoid omissions of the names of artists whose ingenious and beautiful productions are, we regret to state, so seldom brought before the public at large.]

Muss, a skilful painter, who died in 1824. Among his principal works were the Assumption of the Virgin, after Murillo, (for Sir Thomas Baring;) the Battle of Neville's Cross at Brandspeth Castle; several windows at Eaton Hall, the seat of the Marquis of Westminster, and many others.

Miller, a painter of the present day, whose chief works are done in imitation of the ancient style.

Hoadley and Oldfield, two successful artists now living. Their works are remarkable for their minuteness, high finish, and elaborate detail. Many of their performances were lately exhibited to the public, and met with favourable notice. Among their works may be mentioned the copies of those well-known engravings of Martin, *viz.*, Belshazzar's Feast, Joshua, and Nineveh; the noted Kemble family of Harlow; Faith, Hope, and Charity, after Reynolds (a copy of these were done for Charles the Tenth of France). These artists are now engaged upon a splendid window for the Rev. Gale Townley, after Spagnoletti, of the Descent from the Cross, &c., which, it is to be hoped, will be shortly exhibited to the public, and thus prove to the world that the art of painting on glass is not lost, as many foolishly imagine.

Wilmshurst, the painter of the well-known window of the Field of Cloth of Gold, a magnificent production, which was for some time exhibited in Oxford-Street, and unfortunately fell a sacrifice to fire.

Nixon, the painter of many beautiful figures, &c.

Evans, whose principal works were a window at Hornsey Church, and another at Winchester.

A pious acquaintance, remarkable for the quaint shrewdness of his observations, one day, when walking in a garden, having pulled a flower of exquisite loveliness, after expressing, in his own characteristic way, his admiration of its various beauties, took up a clod of the soil in his other hand, and naïvely, but emphatically, exclaimed, "What but Almighty power could extract that from this?" If there was anything ludicrous in the manner, there was nothing but truth and sublimity in the sentiment. Everything in the operations of the Creator is worthy of devout admiration, but I scarcely know anything in the inanimate world which brings together and concentrates so many wonders of designing wisdom and benevolence, as the structure and qualities of a flower,—and assuredly not a little is added to the surprise and pious feeling with which this delightful production is contemplated, when we think of the crude materials from which it is elaborated. The beauty of form and colour, the sweetness of the fragrance, the delicate and skilful nature of the organization, the careful provisions, the forethought, the contrivance, the suiting of parts, as regards the propagation of the species, the adaptations to the subsistence and enjoyment of the insect tribes,—all produced by the artificial union of a few simple and apparently unfit substances, cannot fail to excite in the reflecting mind, the most lively sentiments of astonishment, and to force upon it the conviction, that here, without doubt, is the finger of God.—Duncan.

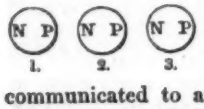
ELECTRICITY.

No. VIII.

THE LEYDEN JAR.

WHENEVER the electrical equilibrium of bodies is disturbed, both kinds (or states) of electricity, are invariably brought into action. And this happens, not only, as we have on a former occasion mentioned, at different parts, or at opposite sides, of any particular substance in which a redundancy of electricity may be excited or accumulated; but its influence extends to other substances in that vicinity; although the latter be at too great a distance for any actual transference to take place. This is termed electrical *induction*; of which we shall give a brief explanation:—

To begin with one of the most simple illustrations we can select, let the figures in the margin represent discs of tin-foil, similiar to those on the spiral tube, of which a description was lately given*. It will, of course, be understood, that if these discs were in contact, and electricity communicated to any one of them, it would diffuse itself over the whole, in the same manner as if they consisted of an entire piece of metal. But the discs are not in contact; and consequently, the electricity can pass from one to the other, only by penetrating the interposed column of air; which is, indeed, the intention of their being so arranged. If, however, we examine this matter a little more attentively, we shall find that the electrical relations previously existing among these pieces of tin-foil, are affected by mere proximity to an electrified body. For example;—Let us suppose the disc marked 1, to represent that at the end of the spiral tube already referred to, and which first receives the spark from the machine. The tube being brought near the conductor, before a spark can pass from the latter to the former, the whole of the discs, whatever be the number of the series, will be *electrified by induction*; which means, that the electricity, excited and brought into action by the machine, and accumulated in the conductor, exercises an influence on surrounding objects, although no part of the redundant electricity is transferred to any of those objects. Supposing the conductor to be charged with positive electricity, the disc at the extremity of the tube, and all that succeed it, will be electrically excited in the following manner, namely, that part of the first disc, nearest to the conductor, will exhibit negative, and the part most distant positive, electricity. This is indicated by the letters N P, and is equally applicable to the series, as to any one particular disc. The instant a spark passes from the conductor to the discs, the induced electricity is dissipated; but is again renewed in the interval between the passing of each spark, although that interval be too brief either to be observed or computed.



To render this class of phenomena more intelligible, let *a* in the following figure, represent a body positively electrified, near to which are to be placed any convenient number of insulated conductors, with feathers attached to them as at *b c* and *d*, and the last, as at *e* communicating with the earth. The apparatus being thus arranged, and *a* imbued with positive electricity, *b* will instantly become negative, *c* positive, *d* negative, *e* positive, and so on throughout the whole series. This will be shown by the feathers in each case attracting each other; a result plainly indicating, that they are in opposite states of electrical excitation.

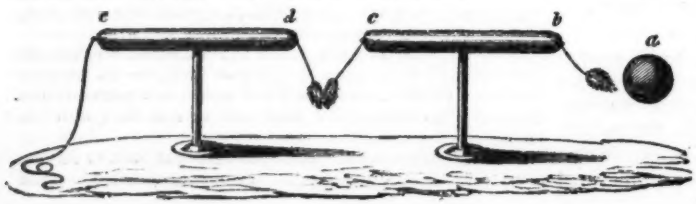
We remark further, that these experiments will be still more interesting, if to different parts of a series of insulated conductors, we attach pith-balls in pairs; by which we shall ascertain that induced electricity, is more active at opposite sides of spherical, and opposite ends of elongated conductors, than at any other parts, and that its intensity gradually diminishes towards the centre of such bodies, becoming there entirely neutral.

The effects of electricity, thus operating at a distance from the excited body, are not in any degree diminished by interposing a third body; provided however, that the latter be not liable to have its own electrical relations disturbed. A plate of glass, therefore, may be placed between two bodies acting on each other inductively, without producing any perceptible change in either.

As induced electricity acts independently of interposed bodies, its intensity, supposing all other circumstances equal, being determined by the relative sizes and distances of the exciting and the excited bodies; so must it be remembered, that its effects cease by the removal of the latter. Hence, therefore, supposing the spherical body *a* in the preceding figure, to contain a certain quantity of electricity, which operates inductively upon the insulated conductors, so long as they remain within a certain distance of *a* and of each other; on removing them, the conductors are immediately restored to their former state of neutrality, the sphere still retaining the same quantity of electricity that it did before the experiment commenced. Thus it will appear, that induced electricity, implies that no actual interchange, or transference takes place between the bodies subjected to its influence. Nothing is gained by one, or lost by the other; the only effect being the temporary disturbance, accompanied by a different arrangement, of the electricity existing in bodies, when in their ordinary and unexcited state. We could enumerate many other examples, tending to the confirmation of these views; but enough, we think, has been said, to prepare the way for understanding the principle and the method of using the *Leyden Jar*; which has been the chief design of our somewhat lengthened remarks on electrical induction.

In the instances of induced electricity just mentioned, it will be observed, that the exciting, as well as the excited bodies are conductors, and the medium through which the excitation is communicated, is an imperfect conductor; the latter consisting of the air interposed between the two former. Now although this, or any other particular arrangement, is not indispensable to the existence of the phenomena, yet it is necessary in every case that a non-conducting, or at any rate, an imperfectly-conducting substance should be present.

To illustrate this by experiment, let us take a pane of window glass, clean and dry, and if *one* side of it be rubbed briskly with a warm and dry silk handkerchief, *both* sides will become electrically excited. This may be ascertained by presenting to the side which has *not* been rubbed, a small pith-ball, suspended by a silk thread, when it will be attracted by the glass; and then if it be immediately presented to the side which *has* been rubbed, the same ball will be repelled; a proof, not only that



* See *Saturday Magazine*, Vol. XIV., p. 24.

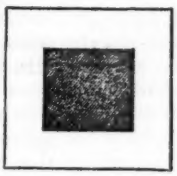
electricity is diffused over both sides of the glass, but also that the electricity on one side is positive and on the other negative.

The same results, but with greatly-increased action, will follow, if one side of the glass be held near the conductor of an electrical machine, taking care, however, whilst this is done, to pass the finger gently backwards and forwards over the other side, otherwise the glass will receive only a very feeble charge. In this case sparks will pass from one side to the other of the glass, which will have the appearance of penetrating it; they are occasioned by the sudden discharge of the accumulated electricity over the edges of, not through, the glass.

In both these experiments we have examples of electrical induction, which takes place through the substance of the glass; in the first, the side rubbed with silk is charged with positive, and the other, of course, with negative electricity; and, in the second, supposing the positive conductor to have been employed, the arrangement will be the same.

Now let us advance a step further.

Glass, it is well known, is a non-conductor, and hence it is difficult to diffuse electricity equally over every part of its surface; and, supposing that to be done, we find it just as difficult to disengage the electricity from the glass again, that is, in such a way as to serve any useful purpose. But these objects are fully attained by covering the glass on both sides with tin-foil, which must not, however, reach to within about two inches of the edges, as represented in the accompanying figure.



A pane of glass thus coated and charged with electricity, by placing one side of it near the conductor, in the manner just now directed, if we make the tin-foil on its opposite sides to communicate with each other, a sharp report is heard, accompanied by a bright spark, indicating that the accumulated electricity has been dissipated, and both sides of the glass restored to their former state of equilibrium.

Let it be particularly noticed, that the use of the tin-foil is to enable us to diffuse electricity uniformly over the surface of the glass, and having done so, to recover the whole of it again whenever we please, giving it any required direction in a condensed, or rather an accumulated form. The thin coating of metal in contact with the glass, performs only the office of a conductor; for it is possible to remove it without dissipating any of the electricity, which adheres to the glass, not to the metal.

But although a pane of glass may do for an illustrative experiment, it is difficult to manage, very liable to be broken, and capable of receiving and retaining only a feeble charge, and, therefore, not adapted for general use.

Here is a figure of the *Leyden Jar*, the most convenient form in which we can employ coated glass. It consists of a vessel, similar to those used as show-glasses by confectioners, coated on both sides, to within about four inches of the top, with tin-foil. The jar, as here drawn, has a cover of mahogany, or other hard wood, through the centre of which passes a brass rod, terminating above by a ball of the same metal, and below by a chain reaching to the bottom of the jar.

Leyden Jars, fitted up as just described, are very portable, but are not the most useful; we prefer them without any cover. In our next paper we shall give instructions for constructing them on our own plan, as we shall also for performing, by their aid, some very beautiful experiments.

THE ECONOMY OF BEE-KEEPING.

NOTHING gives me greater pleasure in a country walk than to hear a bee buzzing by my ear, as I pass a cottage fence. A row of bees is a sign the owner takes pleasure in his home. And a word of advice to such a man is likely to come to good.

In the first place, *Never kill your Bees.* In France, Germany, and Switzerland, they never kill their bees.

In some places they make straw hives, with the top to take off, and fasten it down with wooden pegs: in July they pull out the pegs, and with a large knife cut away the top of the hive from the comb, and cut out what honey the bees can spare, never caring for those flying about their heads; for they will not touch them if they have a pipe in their mouth. And when they have helped themselves they peg the top down again; and the bees will gather enough in August and September for the winter.

Others put a large hive on the top of a strong stock, in May, which prevents their swarming; and this hive they take off when full. Others turn up their hives in July and August, and cut out some combs. Others put wooden boxes on one another, putting empty boxes below, and taking away full ones from the top.

I saw a doctor in Switzerland take honey from twelve hives: he got fifteen pounds from each. The better way is such as is now practising by the Bee Society at Oxford.

You may find funguses, called puff-balls; when ripe they give out a powder like smoke; pick them when half ripe, (the largest are the best,) and dry them; the fungus is fit for use when it will hold fire like tinder. Keep them till you take your bees.

In autumn weigh your hives—mark those which are the heaviest and lightest; this you cannot rightly do unless you weigh them before you put your swarms in, and mark the weight outside. Casts, except they are very early and strong, will scarcely stand the winter.

When the honey season is over, stop up over night those you mean to take up. In the morning take a piece of the fungus, twice as big as a hen's egg; put it in a stick, split at one end and sharp at the other: have a hive as large as that you mean to take up, fixed bottom upwards, (a pail will hold it well). Then light your fungus, and fix the sharp end in the hive you have turned topsy-turvy, and place the hive you intend to take on the top of it, and tie a wet cloth round the two hives, that no smoke may get out. You will soon hear the bees drop down: and tap the top of the full hive to make the bees fall quicker. When they are all quiet, lift the full hive off, and turn all the bees that have fallen on a table, and they will get well again in twenty minutes. Look for the Queen Bee, keep her safe, and sweep all the other bees back into the empty hive; then cut the combs out carefully, and if you have not already found the Queen, it is likely that you will find her at the top of the hive.

Sweep the bees with a feather back into the hive out of which you have taken the combs.

As soon as the bees begin to crawl about, take a hive which is strong enough to stand the winter, or though heavy, weak in bees; stop it up the night before, and put it gently on the empty hive where the smoked one stood before, keeping the bees asunder with coarse canvass, or a sheet of thick paper with pin holes; a sheet of tin, punched with holes, the sixteenth of an inch over, is best of all. Keep the bees for twenty-four hours apart.

On the evening of the second day, draw away the tin, paper, or canvass, without disturbing the hives, tap the empty hive, and the bees which have forgotten their queen which you have taken away, will go up into the full hive, as if they belonged to one swarm.

Early the next morning, when all is quiet, set the doubled hive back in its old place; if you pull away the tin too soon the bees will fight terribly and kill many, and perhaps their queen; for fear of this you must take care of the queen you smoked.

The next day, after the stock has been put back to its own place, put this queen to the mouth of your double hive, and

if any accident has happened to their own queen, they will gladly take the stranger to reign over them.

If you put a tin cover, like an extinguisher with holes in it, over your lighted fungus, it will prevent any of the bees being burnt. This way of smoking is very useful to unite a cast to a stock which is weak, in which case you should smoke both; pick out one queen and put all the stupid bees into one hive that has some comb ready made, and sprinkle them over with a little sugar and beer. They will take to one another when they have helped each other to clean off the sugar with their tongues.

The fact of helping each other in their trouble makes them good friends.

Even if you are lucky enough to have none weak, always unite your casts in a hive, which, though strong, has plenty of room; *for the same number of bees will do more good together than they will in two hives.*

The most wonderful thing is, that a double hive will eat no more honey in Winter than a single one; the reason seems that where there are many bees in a hive, they can keep themselves warm by hanging close together instead of eating. So that in a full hive the same quantity of honey goes farther than in a weak hive, as *each bee eats less* (just as cattle well housed require less food than when exposed to wind and rain).

Have all your hives of the same size, and make them all with a hole at the top, an inch over, with a bung to fit into it.

Capping.—In May, when your hives get full of bees and they begin to hang out, put a small straw hive which will hold ten pounds of honey, on the top of the strong hive, and pull the bung out, with a bit of glass worked into the straw, so that you may see when it is full, (a glass, if you can afford it, is prettier.) The bees will sometimes fill this in a week; take it off directly it is full; it will be white honey, and sell better than that taken on the old plan in September. These little caps will give room for the bees to work, who would otherwise be idle, waiting for swarming.

I have had them hang out for a month together, and not only are they idle, but the other bees are forced to feed them.

The cap must not be larger than I have told you, for if larger you will make it so much cooler, they will not swarm at all; and if large, the queen will lay her eggs there, and you will find black combs instead of honey.

This is the easiest plan, till you have got your stock up to its full number. Then it is more profitable to prevent their swarming.

Few cottagers keep enough bees. There is hardly more trouble in taking care of twenty than of two stocks.

In Germany I saw a man who had two hundred hives, and I wish to show you how to make the most of a good year. Get a fair quantity in a middling year, and not lose all your bees in a bad year. 290 lb. has been taken from a good stock without hurting the bees, whilst the heaviest cottage hive I have heard of was under 100 lb.

I have said it is best to prevent swarming; the reason is, the queen bee lays from ten thousand to thirty thousand eggs in the year. In a stock containing three thousand bees, almost all of them in middling years will be busy in nursing the grubs; for they are such good mothers, they think it their first duty to feed their young: gathering honey is their second.

A swarm goes off: you have two queens, with each 3000 bees, busy in rearing the eggs which the queens lay all through the Summer. They have no spare time to gather honey. So in a *bad year*, a stock with plenty of bees will be almost without honey when you take it in Autumn; and sometimes die in Summer if not fed.

Now if you prevent swarming by giving plenty of room, 3000 bees who were before nurses to the grubs of one queen, will be enough to do the nursing-work of the hive, though so much larger, for each has only one queen. And one queen cannot lay eggs enough to require more nurses. The other 3000 will store honey for you in the spare room you give them—which you may take.

Wooden bottoms I prefer to stone or slate, which so chill the bees which come down on them in the winter, they often cannot get back—and the harder the wood the better.

If bees are left out fronting the sun in Winter, every fine day tempts them out; they find nothing out, and return hungry; and many chilled by a cold wind never come back. You may see hundreds round your hives; if you pick them up and warm them in your hand they will revive; which shows they die of cold, not sickness.

The best place to put bees in Winter is a *dry, dark, cold* room or out-house. Put your bees there the last week in November, and let them sleep quietly till the flowers begin to come out—the end of February.

Put their bottom boards sloping, that all the wet may run out of the door, or still better hang them up in a coarse cloth. Weigh them before you put them away and when you bring them out, and you will find them much stronger as well as heavier than those you leave on their Summer stands. If you have no spare room or out-house, perhaps your neighbour has, and would do you the kindness to let you make use of it; which would make good the golden rule of doing as you would be done by.

In old time, a man to begin would borrow a swarm, to be repaid a year or two after, with five or ten pounds of honey for interest.

If more cottagers kept bees much honey now wasted would be saved. 32,000*l.* worth of wax, beside honey, is now yearly imported; and every sixpence of this might go amongst our own cottagers.

The flowers too are the better for the honey being taken; as the bees carry the dust on their legs from flower to flower. And I heard a farmer say, his orchard bore double the crop it had done before he took to bees. One place may be good for bees in Spring near meadows and lime-trees; and another in Autumn, near commons, when heather is in bloom. In Switzerland you may often see a man trudging up the mountains with a hive of bees on his back.

I must repeat, *Never kill a bee.* Let this be your golden rule, and it will prove a golden rule to you in more than one sense.

Be kind to your bees, treat them like reasonable creatures, and they will fully repay your kindness. A bee is a one-year bird; all that are hatched this year die the next, about July or August, after they have nursed up the young ones. So that all the bees burnt in September are of that year's brood, ready and willing to work for you next Spring.

A Clergyman in Switzerland had one stock 60 years, by turning up the hive every year, and cutting out part of the old black comb, which the bees replaced with new comb. To cover straw hives with thick white-wash is good. The straw backle sometimes harbours a mouse, which gnaws through the hive and eats the honey within, which you may dislodge with your magic *fungus.*

And if moths attack your hive, cut out the combs which have the grubs of the moth in them. Defend your hives from moths and wasps by narrowing the door-way when they are about; they teach you what they want by building up little pillars of wax in the door-way. If robbers have taken a hive, use your fungus directly, and join your bees to some hive which wants strengthening, and keep them shut up two days till they get friends.

None but the poor ones rob,
And none but the weak are robbed;
Unite your weak hives,
And feed your poor ones.

You say feeding costs something, but every pound of food given in a cold late Spring, will be repaid when the weather changes; and feed your bees for two or three days after they have swarmed: it saves time in getting the combs made.

You do not waste your honey by feeding, for you will find a peck where you gave a quart.

Sometimes feeding in dry, hot weather will save the lives of the grubs, their dry-nurses cannot then feed. Autumn feeding should not be continued after September; weigh your hives and if short of 20 lb., feed them; then they will lay it all up safe and handy.

Never press your combs, let the honey drain from them: so you will get clear honey; when all has run out save the combs, your bees want food in summer, when they will clear them for you and repay you too. Again I say let nothing be wasted; if you feed with beer and sugar, do not put more than one pound of sugar with a quart of beer; nor boil it more than five minutes.

If the bees sting you, pull out the sting, squeeze out the poison with the pipe of a small key, and put a little honey on to keep away the air, and if done at first the swelling will generally be a mere nothing.

An old writer says, if thou wilt have the favour of thy bees be cleanly in thy person, and do not smell of leeks, or the like, nor *hastily* stir amongst them; but softly moving thy hand before thy face, put them away.

Remember, nothing worth doing can be done without a little trouble, and above all, help each other all you can.

[From the Rev. W. S. COTTON'S *Letter to Cottagers.*]

ENGLAND IN THE OLDEN TIME.

II. Justs and Tournaments.

Justs and Tournaments! How many recollections of Knights and Ladies—the former always brave, and the latter always fair—do these terms call up! They formed the very life of the chivalric ages, when the cessation of actual war allowed the knights time for a peaceful display of their prowess.

Tournaments and Justs, though often confounded with one another, differed considerably. The tournament was a conflict between many knights, divided into parties, and engaged at the same time. The just or joust was a separate trial of skill, when one man was opposed to another. The just was frequently included in the tournament, but not always. In the romantic ages both these diversions were held in the highest esteem, being sanctioned by the countenance and example of the nobility, and prohibited to all below the rank of an esquire.

A sort of Tournament, under the name of the Troy game, was practised among the Romans, in which the Roman youths used to exercise themselves in partisan encounters. But the real modern tournament appears to have sprung up about the ninth or tenth century, and was introduced in England shortly after the Norman conquest. Fitzstephen, a writer living about that period says, that every Sunday in Lent it was customary, immediately after dinner, for great crowds of young Londoners, mounted on war horses, well trained, to perform the necessary turnings and evolutions, to ride into the fields in distinct bands, armed with shields and headless lances, where they exhibited the representation of battles, and went through a variety of warlike exercises. Many of the young noblemen who had not attained the honour of knighthood, came from the king's court, and from the houses of the great barons, to try their skill in arms. The youth being divided into opposite companies, encountered one another: in one place they fled, and others pursued, without being able to overtake them; in another place one of the bands came up to and overturned the other, and so on.

There was a kind of justing called the *cane game*, which is said to have had its origin from the following circumstance. Richard Cœur de Lion, being at Messina in Sicily, on his way to the Holy Land, went with his cavalcade on Sunday afternoon, to see the popular sports exhibited without the walls of the city, and, on their return they met in the street a rustic, driving an ass, loaded with hollow canes. The king and his attendants took each of them a cane, and began, by way of frolic, to tilt or just with them, one against another; and it so happened that the king's opponent was William de Barres, a knight of high rank in the household of the French king. In the encounter they broke both their canes, and the monarch's hood was torn by the stroke he received, which made him angry; when riding with great force against the knight, he caused his horse to stumble with him, and while the king was attempting to cast the knight to the ground, his own saddle turned round, and he himself was overthrown. He was soon provided with another horse, stronger than the former, which he mounted, and again assailed de Barres, endeavouring by violence to throw him from his horse, but he could not, because the knight clung fast to the horse's neck. All this incensed the monarch so much, that at the termination of the conflict, he vowed enmity against de Barres, and was with difficulty appeased by the French king. From this singular conflict arose a custom of justing with hollow canes.

In early times it was customary in England for a monarch or a nobleman to entertain many knights at his table, and make justs form a part of the daily routine. King Arthur's round table, was, according to tradition, the board at which a fraternity of valiant knights ate together in friendly communion, after their justs, and in order to set aside all distinction of rank or quality, seated themselves at a circular table, where every place was equally honourable. Roger de Mortimer, a nobleman in the reign of Edward I., established a round table at Kenilworth, for the encouragement of military pastimes; where one hundred knights, with as many ladies, were entertained at his expense. The fame of this institution occasioned a great influx of foreigners, who came either to initiate themselves, or to make some public proof of their prowess.

About seventy years afterwards, Edward III. erected a splendid table of the same kind at Windsor, but upon a more extensive scale. It contained the area of a circle two hundred feet in diameter, and the weekly expense for the maintenance of the table, when it was first established, amounted to one hundred pounds, which was afterwards reduced to twenty pounds, on account of large sums of money required for the prosecution of the war with France. This receptacle for military men gave continual occasion for the exercise of arms, and afforded to the young nobility an opportunity of learning, by way of pastime, all the requisites of a soldier.

In the justs, the combatants generally used spears without iron heads; and the excellence of the performance consisted in striking the opponent upon the front of his helmet, so as to beat him backwards from his horse, or break the spear. Froissart mentions a trick used by Reynaud de Roy, at a tilting-match between him and John de Holland. He fastened his helmet so slightly upon his head that it gave way, and was beaten off by every stroke that was made upon the visor with the lance of his opponent, and of course the shock he received was not so great as it would have been, had he made the helmet fast to the cuirass. This artifice was objected to by the English, but John of Gaunt, duke of Lancaster, who was present, permitted Roy to use his pleasure; though he at the same time declared that for his part he should prefer a contrary practice, and have his helmet fastened as strongly as possible.

The tournaments were conducted with great form and ceremony. The two barons, whose knights were to form the opposing parties in the tournament, were to appear at their pavilions at either end of the barrier two days before the commencement of the ceremony; when each of them had to cause his arms to be attached to his pavilion, and to set up his banner; and all those who wished to be admitted as combatants on either side, were in like manner to set up their arms and banners in the stations allotted for them. Upon the evening of the same day they were enjoined to show themselves at their stations, and to expose their helmets to view at the windows of the pavilion. On the following day the champions were to be at their parade by ten o'clock in the morning, to await the commands of the governor or baron, and on this occasion the prizes of honour were determined. On the morning of the day appointed for the tournament, the arms, banners, and helmets of all the combatants were exposed at their stations, when certain persons were appointed to examine them, and approve or reject them at their pleasure. The examination being finished, and the arms returned to the owners, the baron who was the challenger then caused his banner to be unfurled, and his arms to be nailed

to his pavilion; and any knight who was not at his station at this moment, was not permitted to join in the approaching encounter. The kings at arms and the heralds then went from pavilion to pavilion, crying aloud "To achievement, knights and squires, to achievement!" When the two barons had taken their places in the lists or barrier, the champions or combatants of both parties arranged themselves, every one by the side of his banner. In this position they remained until the signal for the encounter was given.

The description of all the various events of a tournament has been so vividly and so frequently given by historians, poets, novelists, and dramatists, that we need not dwell upon them. The charge of the knights, the unhorsing of some luckless combatant, the shivering of lances, the blowing of the trumpets, and the approbation of the ladies who witnessed the conflict, have formed the theme of many a narrative. In the days of chivalry the justs were usually made in honour of ladies, who presided as judges paramount over the sports, and whose determinations were in all cases decisive. Hence, in the spirit of romance, arose the necessity for every "true knight" to have a favourite fair one, who was not only esteemed by him the paragon of beauty and of virtue, but supplied the place of a tutelar saint, to whom he paid his vows, and addressed himself in the hour of peril; for it seems to have been an established doctrine that love made valour perfect, and incited heroes to undertake great enterprises.

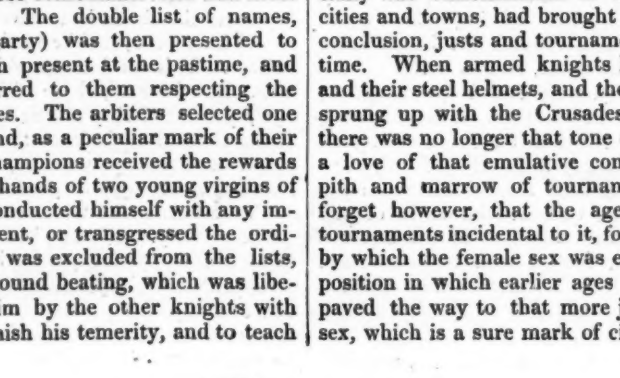
In the case of a tournament where several combatants contended for a prize, such as a rich sword, &c., the combatants, after the termination of the conflict, met in the evening at some place appointed for the purpose, when they were joined by the ladies and by others of the nobility, who had been spectators of the sports, and the time we are told was passed in feasting, dancing, singing, and merry-making. After this the heralds were called together, and were required to give the names of those combatants who had most signalized themselves. The double list of names, (that is one for each party) was then presented to the ladies who had been present at the pastime, and the decision was referred to them respecting the awardment of the prizes. The arbiters selected one name for each party, and, as a peculiar mark of their esteem, the favourite champions received the rewards of their merit from the hands of two young virgins of quality. If a knight conducted himself with any impropriety in a tournament, or transgressed the ordinances of the sport, he was excluded from the lists, with the addition of a sound beating, which was liberally bestowed upon him by the other knights with their truncheons, to punish his temerity, and to teach him to respect the honour of the ladies and the rights of chivalry. The unfortunate culprit had no other resource in such cases than that of supplicating the mercy of the ladies who were to be the judges, and humbly entreating them to interpose their authority in his behalf, because the suspension of his punishment depended entirely upon their intercession.

It may readily be supposed that such exciting scenes as these were not without their effects on the humbler classes of the community, and that the latter endeavoured to emulate, in some rude manner, the justs and tournaments of their superiors. There are in existence some old manuscripts, in which are representations of a vulgar kind of tournament, performed on the water, as in the accompanying cut. Two boats have a platform in the middle of each, and on this platform is situated a man armed with a lance, or with something to serve the purpose of a lance. The rowers in the boats bring the two combatants within reach of each other's lances, and the contest consists in an endeavour on the part of each one to overturn the other into the river. When Queen Eilzabeth was at Sandwich, she was entertained with a water-tournament of this kind, at which, it is said she was highly amused.

The children of the nobility used to have wooden horses, and combatants also of wood, mounted on wheels, and the figures representing the riders were purposely placed upon the horses in a very insecure manner. Each figure had a lance in its hand, and each assemblage,—man, horse, and all,—was drawn by a string. The contest was to upset the wooden warriors in the same way as "children of a larger growth" were wont to do with warriors of real flesh and blood.

Sometimes children of the humbler classes would have a mock tournament on the ice, making their own legs supply the place of horses, and dubbing a stout stick with all the honours of the lance.

When the political condition of Europe, and especially the establishment of walled and commercial cities and towns, had brought the age of chivalry to a conclusion, justs and tournaments died at the same time. When armed knights laid aside their armour and their steel helmets, and the romantic spirit which sprung up with the Crusades had ceased to exist, there was no longer that tone of feeling which led to a love of that emulative contest, which formed the pith and marrow of tournaments. We must not forget however, that the age of chivalry, and the tournaments incidental to it, formed one of the means by which the female sex was elevated from the mean position in which earlier ages had found them, and paved the way to that more just appreciation of the sex, which is a sure mark of civilization.



WATER-TOURNAMENT.

LONDON: Published by JOHN WILLIAM PARKER, West Strand; and sold by all Booksellers.